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NOTES ON CLIMATOLOGY.

BY

ROBERT DeC. WARD.

The Influence of Climate on Military Operations.—The more closely we study the relations of climate and man, the more striking is seen to be the control which climatic conditions exercise over the many activities and peculiarities of the human race. That the influence of climate may clearly be seen in many of the migrations of men from one country to another has long been recognized. Even the smaller details of such migrations, whether peaceful or warlike, often point distinctly to climatic or meteorologic control. In the latter connection reference may be made to a recent publication, in which emphasis is laid upon the influence of climate on military operations. The volume is entitled *Outlines of Military Geography*, and is by T. Miller Maguire, LL.D. (Cambridge Geographical Series, Cambridge, England, 1899.) The discussion in question is contained in Chapter XIV, of which the title is *Influence of Climate on Military Operations.* After pointing out the importance of military organization and good hygiene, and noting that "the inhabitants, however well used to the climate, will perish if unprepared, while the invader, if provided with all requisites of clothing, food and drinks, will thrive," Lieut. Maguire enumerates a number of cases in modern warfare in which accidents of climate and weather have resulted in disaster to armies. Napoleon's unfortunate invasion of Russia, rashly undertaken, furnishes a terrible illustration of the effects of a severe northern winter. In 1877, the Russians lost over 6,000 men at Shipka during the frost and snow of the storm of December 18–23. In January, 1814, a sudden thaw obliged the French troops to undergo the most terrible fatigue in forcing their way through the deep and miry alleys of the forest of Der during their movement from St. Dizier to Brienne. During one of Gen. Grant's campaigns in Virginia, after several days of fair weather, there came a very heavy rain, which lasted a day and a night. As related in Porter's *Campaigns with Grant*,

> "the country was densely wooded and the ground swampy, and by the evening whole fields had become beds of quicksand, in which the troops waded in mud above their ankles, horses sank to their bellies, and waggons threatened to disappear . . . . The roads soon became sheets of water, and it looked as if the saving of that army would require the services, not of a Grant, but of a Noah."

Other instances of a similar kind are cited, and, as a whole, the chapter is extremely suggestive both to the student of climatology and to the student of military science. A recent illustration of the difficulty of campaigning during a rainy season has been furnished by the experience of the American troops in the Philippine Islands, to which reference was made in these NOTES in Vol. XXXII of the BULLETIN (No. 1, 1900), pages 43–45.

THE BOXER OUTBREAK IN CHINA AND THE CHARACTER OF THE SEASONS.—Closely allied to the subject referred to in the preceding paragraph, and a very recent instance of the influence of weather conditions upon history, is the fact that the "Boxer" outbreak in China, which has precipitated a war of international importance, whose end it is as yet impossible to foretell, was to some extent due to the character of the season immediately preceding this outbreak. In an article on The Chinese Boxers, in the *National Geographic Magazine* for last July, Mr. L. J. Davies emphasizes the importance of the seasonal control over the welfare and the conduct of the people of Northern China in the following words:

> "It must be borne in mind . . . that economic conditions greatly assist the organizers (of the Boxer movement). In good seasons the people of North China must secure two crops each year from the same land in order to maintain a condition of average welfare. If the spring yield fails there is considerable suffering, and if spring and fall crops are bad, conditions of local famine result. A considerable proportion of the people are therefore always on the verge of destitution. In seasons of distress, highway robbery is very frequent. The more wealthy travellers carry arms, and during the winter months housebreaking is so common that one or more members of well-to-do families watch all night. Hence, beginning by looting the homes of Christian Chinese, the 'Boxers' proper attracted to themselves a great company of the hopelessly poor, who, joining them for plunder, would be as ready to fall away when the booty was no longer to be obtained."

Another writer on the "Boxer" outbreak, Arthur Sowerby, in the *Contemporary Review* for July, also mentions among the causes of the outbreak the scarcity of rain in the preceding autumn, and calls attention to the fact that the winter days, when the villagers and canal population are idle, were spent by these people in drilling.

SWISS GLACIERS AND OSCILLATIONS OF CLIMATE.—In the *Rapport de la Commission Internationale des Glaciers*, presented to the International Geological Congress held in Paris during the past summer, the results of the studies of the Committee in regard to the glaciers of the Alps are thus summarized: After 1810 there was a marked and rapid advance of the ice, which reached a maximum about

1820. Between 1820 and 1850 there came a slight recession in cases where the glaciers did not remain stationary, and towards 1850 a new advance took place, similar to the first (1810–1820). Next a general and considerable retreat took place, which was so marked between 1860 and 1880 that it almost seemed as if the Alpine glaciers would disappear entirely. About 1880 the retreat of the glaciers of the western Alps, especially those of the Mont Blanc group, began to stop, and a new advance commenced in some cases. In the eastern Alps the glaciers did not follow suit until 10 or 20 years later. In general, it can be said, with certainty, that the period of great retreat has ceased, and has been replaced by movements in the opposite direction. The interesting point in connection with these studies, from the standpoint of a climatologist, is the relation of these variations in the glaciers to climatic oscillations. The *Commission Internationale des Glaciers* shows that these variations in the Alpine glaciers correspond to the 35-year period of climatic oscillations discovered by Brückner. The periods 1806–1825, 1841–1855 and 1871–1885 were rainy. Each one of these periods brought a corresponding advance of the glaciers, which was very strongly marked in the first two periods, and was suggested in the last.

THE CAUSE OF SUNSTROKE.—One of the difficulties in the way of the acclimatization of the white man in the tropics is sunstroke, which, according to district and season, plays greater or less havoc with white residents, and especially with white troops, in certain tropical countries. Every discovery that throws any light on the cause of sunstroke is especially welcome at the present time, when the "control of the tropics" is a subject of such paramount importance to so many nations. About two years ago the theory was advanced by Dr. Sambon that sunstroke is an infectious disease, and is due to the influence of a certain distinct microbe. This view, which was radically opposed to the ideas previously held on this subject, led to considerable discussion, but was not generally accepted. Recently Mr. E. H. Freeland, who, according to *Nature* (Aug. 23), has had exceptional opportunities of observing cases of sunstroke both ashore and afloat, shows, in the *Middlesex Hospital Journal* for July, that the older view as to the cause of sunstroke seems to him sufficiently to explain all the facts, and to be well supported by the evidence at hand. Mr. Freeland concludes as follows:

> "Whether sunstroke be due to external physical causes, or whether it be an infectious disease and due primarily to a micro-organism which has yet to be isolated,

must be decided in the future. For the present it seems to me that there is ample evidence for believing that sunstroke is due primarily to thermic influences—the exposure of the body to a hot, moisture-laden atmosphere—and, secondarily, to the circulation in the blood of certain toxic poisons, the result of perverted tissue metabolism; and that, until more tangible evidence is brought forward to prove that the affection is due to microbic influence, one may safely accept the older doctrine with regard to its causation as a sound working hypothesis, if nothing else."

THE WEST INDIAN HURRICANE OF SEPTEMBER 1–12, 1900.—The first scientific report upon the West Indian hurricane of last September, which will probably go down to history as the "Galveston Storm," has been published in the October number of the *National Geographic Magazine*, and was written by Prof. E. B. Garriott, of the Weather Bureau. The presence of a disturbance in the vicinity of the Windward Islands was indicated in the weather reports of the last days of August. During the first three days of September the hurricane moved west over the Caribbean Sea, and on the 4th, during the night, recurved northward over western central Cuba. On the morning of the 6th the centre had reached the southern portion of the peninsula of Florida. The path up to this time had been normal. During September 6 the hurricane made an abnormal curve to the westward, increasing in intensity and causing severe gales from the western Bahamas to Florida. Moving westward over the Gulf of Mexico, the storm centre reached the Texas coast late on the afternoon of September 8, and then recurved northward, passing directly over Galveston as a fully developed hurricane. The lowest barograph reading at Galveston was 28.53 inches at 8.10 P.M., when the centre passed over the city. The storm then advanced northward over Texas, Oklahoma and eastern Kansas, reaching Iowa on September 11. Here the dissolution of the disturbance seems to have been averted by the advance of a second cyclonic depression from the northwest, which strengthened the original storm. The further movement was to the eastward, over the Great Lakes, the St. Lawrence Valley and Newfoundland, there being a constant increase in intensity. The chief interest in this hurricane, apart from the terrible tragedy at Galveston, is the fact of the two sharp abnormal curves in the course of the storm—one over the Florida peninsula and the other on the Texas coast.